

IN THE DRAWINGS

Figure 2 is herein amended with a replacement sheet by addition of reference numeral 16 to identify diodes.

Figure 11 is herein amended with a replacement sheet by addition of reference numeral 50 to identify the hybrid switch.

(Please also see the Remarks portion of this Amendment.)

REMARKS

The specification was objected to and has been corrected at pg. 7, line 9. The final three lines of page 7 were also amended for consistency with the amended figure 11. New matter was not added.

Figures 2 and 11 have been corrected and replacement sheets have been provided including those figures on respective sheets. Marked-up copies of the figures are also provided to show the modifications. Please note that reference numeral 50 is used in amended Figure 11 because numeral 40 was already designated in Fig. 2 for the control function.

The amended claims above are respectfully believed to recognize and answer the informalities noted by the Examiner.

Claims 1-4, 8, 10, 11, 13, and 14 were rejected under 35 USC 102 as anticipated by Bowles, 5,155,289. Claims 5, 6, 12, and 15-20 were rejected for obviousness under 35 USC 103 over Bowles in view of Gold, 5,953,224. Claims 7 and 21 were rejected for obviousness under 35 USC 103 over Bowles in view of Vercelloti, 5,774,000.

Claim 1 was amended, without addition of new matter, to indicate that the hybrid switch of the present invention is in an electrical line so that line current from a source terminal to a load must flow through the hybrid switch on the way back to the other source terminal (or, for example, ground). This is a basic electrical circuit and several such circuits are illustrated and described in the present application, for example, Figure 8 and its descriptions.

For more rapid comprehension, words have been added to claim 1 to define that included in the hybrid switch in the line there are two switch modules connected electrically in parallel (e.g., Fig. 2). Each switch module can be operated in an open off state or alternately in a closed conducting state.

Thus it is inherent that when the electrical source is connected, there will be no line current when both parallel switching modules are in the open off state. When there is line current, the line current may flow solely through the first switching module, or the line current may flow solely through the second switching module, or the line current may be shared by the switching modules simultaneously. Where the line current actually flows depends on the open /closed states of the respective switching modules and/or the relative resistances of the two paths.

As defined in claim 1, in the present invention the second switching module is for conduction, that is, the second module has low losses for steady state line current. As further defined in claim 1, in the present invention the first switching module is for switching, that is, the second module has low losses for transient line current.

On the other hand, Bowles does not have a line switch for carrying load current, wherein separate paths are provided in parallel, one path for conduction, and one path for switching. Bowles is not concerned with a problem of where losses occur in order to minimize them. To the contrary, Bowles is using parallel and series MOSFETS and other devices for commutation and for turning off devices like SCRS which latch when triggered.

For these reasons it is respectfully submitted that claim 1 is not anticipated by Bowles and the rejection under 35USC 102 is inappropriate in this case.

It is respectfully submitted that the remaining claims are also allowable, if only for their dependencies on claim 1. However, it is respectfully believed that the 103 rejections are also inappropriate in that each relies on Bowles and additionally Gold and Vercelloti respectively. None of the three references is concerned with or suggests taking switching losses in a particular switching module, and taking steady state losses in another parallel switching module, each module constructed to reduce its type of loss.

Further, minor amendments have been made for the sake of quicker comprehension, better punctuation and antecedent bases, in claims 3, 4, 10, and 13, as will be apparent upon inspection. New matter was not added.

Claims 11 and 14 have been amended to allow quicker comprehension of the openings and closing of the switch modules by the control circuit. With the claimed sequence of operations, a steady state line current that has been flowing through the second switching (conduction) module is stopped as the hybrid switch is opened. In the time that elapses while changing from a closed current-flowing hybrid switch to an open (off) hybrid switch, little if any of the incurred switching losses occur in the second switching module. The losses incurred as current drops to zero, occur primarily in the first switching module.

The sequence is as follows:

a) THE HYBRID SWITCH IS CONDUCTING with the second switching module closed and carrying steady load current: the first switching module is non-conducting.

b) The second switching module is placed in its open state: load current is diverted from the second switching module so as to pass through the parallel first switching module.

c) Then, the first switching module is placed in its open state: current flow ceases. THE HYBRID SWITCH IS OPEN.

In amending claims 11 and 14, new matter was not added. Please see the original specification, for example, at page 3, lines 7-18.

An earnest effort has been made to be fully responsive to the Examiner's objections. In view of the above amendments, drawing changes, and remarks, it is believed that Claim 1 and all claims dependent therefrom are in condition for allowance as amended. Passage of this case to allowance is earnestly solicited.

However, if for any reason the Examiner should consider this application not to be in condition for allowance, he is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

A fee for a one month time extension is enclosed.

Respectfully submitted,

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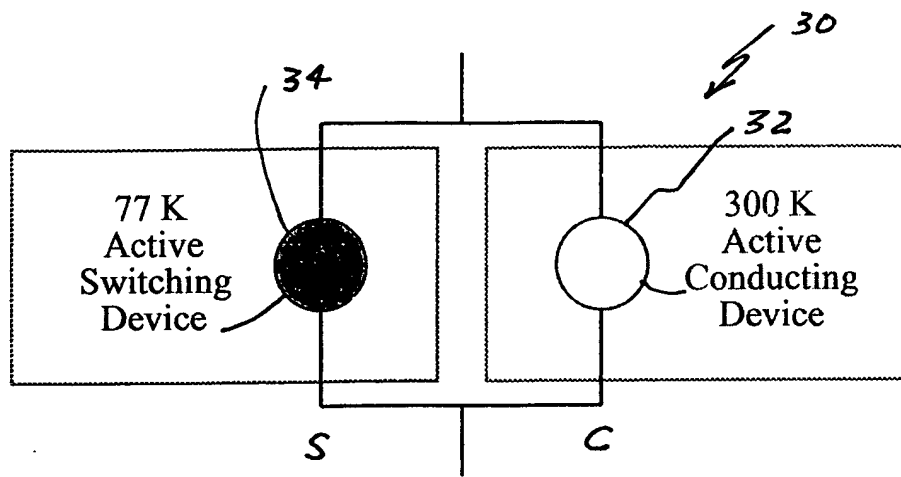


Figure 10

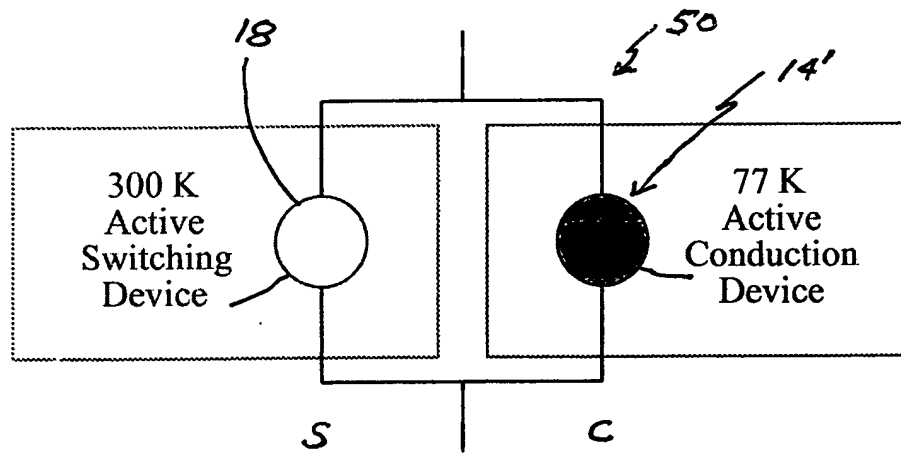


Figure 11

FIGURE 1

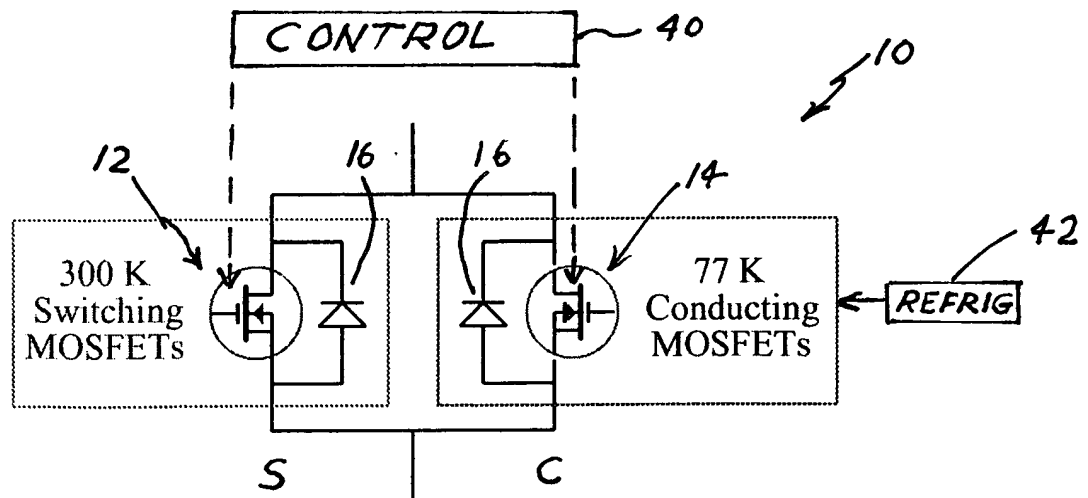
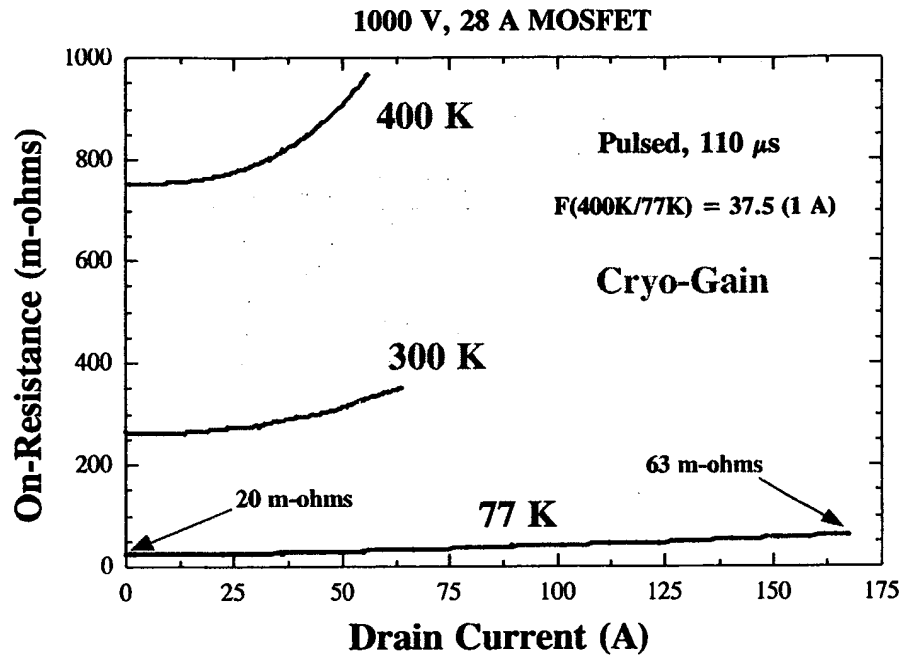


Figure 2